



PERSONA CIÈNCIA EMPRESA  
UNIVERSITAT RAMON LLULL

## **COURSE: COMPUTER AIDED ENGINEERING FOR INDUSTRIAL PRODUCT DEVELOPMENT**

**SUBJECT MATTER:** Elective

**MODULE:** Professional Supplements

**STUDIES:** Degree in Chemical Engineering

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### **GENERAL CHARACTERISTICS**

**Type:**  Basic Formation,  Compulsory,  Elective

Final Degree Project,  Internship

**Duration:** Semestral

**Semester/s:** 8

**Number of ECTS credits:** 6

**Language/s:** Spanish, Catalan

### **DESCRIPTION**

#### **SHORT DESCRIPTION AND JUSTIFICATION**

The subject of engineering of computer-aided industrial product aims to show the student the current computer tools that allow to verify the correct operation and optimize a design of some type of industrial product. The subject is transversal focusing on the case studies of each student based on their options.

For the electric ones will be analyzed modules that allow to design the wiring, to place motors, switches and all type of circuits.

For the energy of study cases, they will focus on the study of temperatures, dilatations, heat transfer and energy efficiency. In addition, the calculation of energy consumption in the manufacture of the product will be addressed.

For the mechanics of the practical cases, they will evaluate the correct dimensioning of the pieces to avoid their fracture, to avoid resonances, to analyze the aerodynamic loads, to allow the coupling and to design the appropriate machinery.

For the intensification of materials, the possibility of defining different material laws will be analyzed at the time of simulating and the cost of purchasing materials will be analyzed based on the chosen manufacturing process, reaching the size of the molds and the injection of plastic as a practical example. The subject aims to inform the student about the different modules available with available software in the classroom and free and educational software to download the student on their laptop.



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### **COMPETENCES**

- Be able to assess the impact of their professional activity on the sustainable development of society. (T3)
- Be able to incorporate contemporary aspects related to the exercise of their profession. (T5)
- Ability to integrate the contents worked on in different subjects studied in the Degree in Chemical Engineering and situate it in a real industrial framework, to be introduced into the specific tasks of a technician in an industrial company and to put into practice activities of collaboration and teamwork with other professionals from different fields and levels of responsibility in the company. (CP3)

### **PREREQUISITES**

According to the program planning and academic regulations.

### **CONTENTS**

Theoretical and practical:

1. Introduction to software available.
2. Configuration and infrastructure.
3. Exchange of files between various software.
4. Tables of design and parameterization.
5. Surfaces.
6. Geometric optimization.
7. Digitization and sketch tracing for design.
8. Folded sheet metal.
9. Molds and dies.
10. Macros and powercopies.
11. Static and dynamic rigidity
12. Dilatations and heat transfer
13. Kinematics and kinetic
14. Internal and external fluidodynamics.
15. Injection of plastic
16. Ergonomic studies
17. Manufacturing costs
18. Environmental impact and life cycle analysis



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### **METHODOLOGY**

#### **LEARNING ACTIVITIES**

<b>Learning Activities</b>	<b>Hours</b>	<b>ECTS Credits</b>	<b>Competences</b>
Lectures	27	1,0	T3,T5,CP3
Case and Problem-Solving Sessions			
Seminars			
Practical & Lab Work	54	2,0	T3,T5,CP3
Presentations	13	0,5	T3,T5,CP3
Personal study	55	2,0	T3,T5,CP3
Assessment Tasks (Exams, Continuous Assessment...)	13	0,5	T3,T5,CP3
<b>TOTAL</b>	<b>162</b>	<b>6,0</b>	

#### **TEACHING METHODOLOGY**

The sessions are divided in an hour of theory in which the concepts are explained to students followed by two practical hours in which the student tests these knowledge before a specific design requirement. For the practical session, the group is divided into several professors to be able to have more personalized attention in the face of specific doubts when performing a specific task.

The students that are in the computer room will use software with high CPU, RAM and calculation speed requirements. The rest will study cases with the software on your individual laptop and then rotate and compare methodologies. For the personal study the student has all the information of normalization in electronic format since the subject constantly requires the consultation of tables and regulations.

To go by linking the different techniques the student will be applying the concepts to a specific project that will be presented at the end of the subject.



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### **ASSESSMENT**

#### **ASSESSMENT METHODS**

<b>Assessment Methods</b>	<b>Weight (%)</b>	<b>Competences</b>
Final Exam	40	T3,T5,CP3
Follow-up Activities	20	T3,T5,CP3
Reports and Presentations	20	T3,T5,CP3
Participation	20	T3,T5,CP3

#### **LEARNING OUTCOMES**

The student will have acquired:

- The student must show that he knows how to choose the right software for his industrial product. (T3, T5, CP3).
- The student must demonstrate that he is able to integrate previous knowledge using support software. (T3, T4, CP3).
- The student must demonstrate that he is capable of carrying out a project integrating the knowledge acquired in the subject (T3, T5, CP3).

#### **QUALIFICATION**

The rating is given by the weighted average of the different assessment methods indicated in the corresponding table above:

Final exam	40%
Monitoring activities	20%
Participation	20%
Reports and presentations	20%

To average, all notes must be equal to or greater than 4.0 and the weighted average of the notes must be equal to or greater than 5.0.



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### **ASSESSMENT OF THE COMPETENCES**

For the assessment of the competences of the subject T3, T5, CP3 they will be used sub-sections of each one of the deliverables to which the student faces during the course. Each delectable part of the note will reflect the ability to analyze and assess the social and environmental impact of technical solutions. (T3), their ability to develop learning skills necessary to undertake further studies and to recognize the need for continuous training for their proper professional development. (T5) and finally its ability to integrate the contents worked on different subjects studied in the Degree in Chemical Engineering and situate it in a real industrial framework. (CP3). In the end, each exercise to evaluate will be evaluated on 10 points, stating the note of each competition.

### **BIBLIOGRAPHY**

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- “A Commands Guide Tutorial for Solidworks 2007”, Planchard, David C.; Planchard, Marie P.; Schroff Development Corporation, (2007), ISBN 978-1-58503-332-4, IQS-xx.
- “A Commands Guide Tutorial for Solidworks 2008”, Planchard, David C.; Planchard, Marie P.; Thomson Delmar Learning, (2008), ISBN-10: 1-42835301-1, ISBN-13: 9781-4283-5301-5, IQS-004.42:744(035) Pla.
- “El gran libro de SolidWorks Office Professional”, Gómez González, Sergio; Marcombo, (2007), ISBN Marcombo 978-84-267-1458-9 ISBN Alfaomega 978-970-15-103-3, IQS-004.42:744(035)-Gom.
- “Advanced Catia Workbook- Knowledgware and Workbenches Release 16” Cozzens, Richard; Schroff Development Corp (2007), ISBN: 9781585033218, IQS-004.42:744(076)-Coz.
- “CATIA V5 Tutorials Mechanism Design & Animation” Nader G. Zamani; Jonathan M. Weaver; Schroff Development Corporation (2007), ISBN-13: 9781585033577, IQS-004.42:744(035)-Zam.
- “Análisis y diseño de piezas de máquinas con Catia v5” Vásquez Angulo, Jose Anotonio; Marcombo (2009), ISBN-978-84-267-1542-1,
- “El libro de Catia v5” del Río Cidoncha, María Gloria; Martínez Iomas, María Eugenia; Martínez Palacios, Juan; Pérez Díaz, Silvia; Tébar (2006), ISBN-84-7360-249-8, ISBN 978-84-7360-249-5



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**DOCUMENT HISTORY**

**PREVIOUS REVISIONS**

**CURRENT REVISION**

May 2019, Dr. Andrés-Amador García Granada